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IMAGE ANALYSIS (U)

by

[Redacted]

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MONTHLY REPORT

ON

[Redacted]

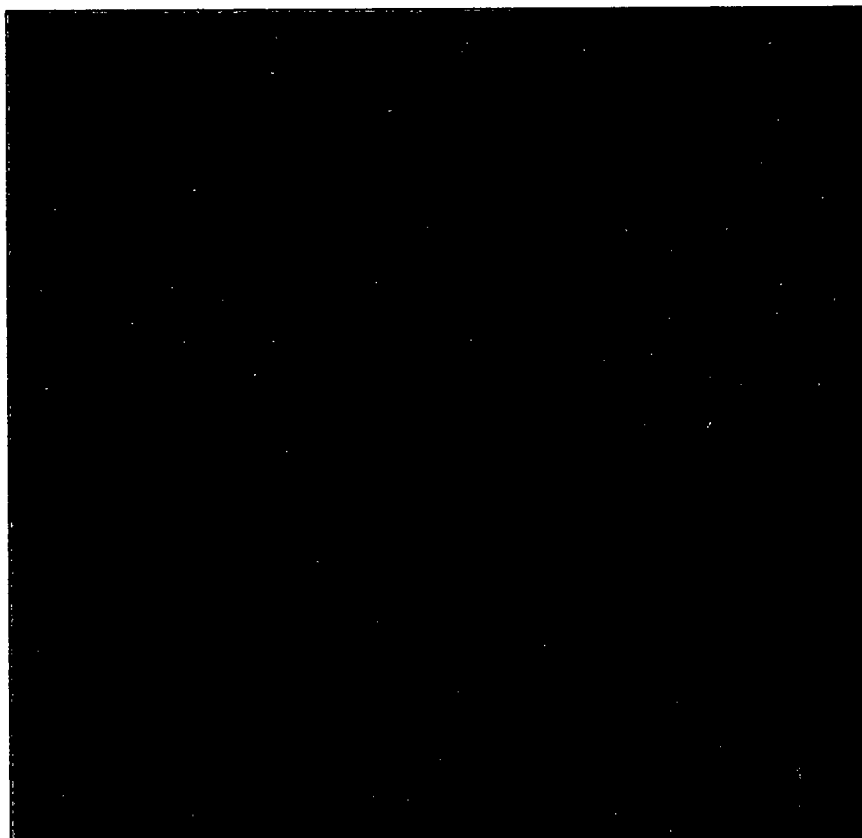
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Reporting Period:

1 December 1968 to 1 January 1969

14 January 1969

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MONTHLY REPORT  
ON  
IMAGE ANALYSIS (U)

I. IDT AND IQ STUDIES

Experimental studies utilizing targets manufactured by [ ] last year have been started and are very near completion. These targets were analyzed using the [ ] Isodensitracer<sup>R</sup> and the Joyce-Loebl microdensitometer, separately, with both clear and shaded (Wiener) scanning apertures. The same imagery was then run through the Projection Printer - Image Quantizer system in both the quantizing and differentiating modes. The only remaining portion to be completed is evaluation using the Image Quantizer in the quantizing derivative mode. At [ ] we have used our commercially available Image Quantizer in both the quantizing and derivative modes, but lack capabilities available in the instrument previously built under this contract.

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Generalizing our results so far leads us to a few conclusions. Mensuration performed on imagery using the density quantizing technique leads to gross operator error in the location of edges. This is due to both lack of a "rule" for locating edges and, even if such a rule did exist, consistency in utilizing the rule would contain large inaccuracies. This pertains to both the IDT and Image Quantizer (in the quantizing mode), with or without shaded apertures.

The derivative mode of the I.Q. seems to have possibilities. Experimentally, we were able to consistently locate edges down to within a small percentage of their absolute value to almost as high a frequency as is contained on the film. At this time, our sample size is small, but a cursory look into the theory of locating edges says; locate the density inflection point, which is equal to the maximum of the first derivative or the zero of the second derivative for finding edges. This will be expanded in theory, practice and illustrated with results in the final report.

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## II. SPATIAL FILTERING IN SCANNING SYSTEMS

An experiment is currently underway to determine if edges can be enhanced by inverse filtering in the laser-illuminated microdensitometer. The object is a simulated operational edge made by contact printing a  Mensuration target onto 8430 film. As the transfer function of the taking system is known, and that of 8430 is known fairly accurately over the frequency range of the taking system, the inverse filter can be calculated.

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As discussed in the last quarterly report, the inverse filter cannot be realized over its entire range without absorbing virtually all the light passing through the system. Several approximate filters have therefore been fabricated, and these will all be tested to see which gives the best result. If these results are promising, the best filter will be used on some of the objects in the  targets which are near the resolution limit.

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**PROGRESS REPORT NO. 5**

**PROJECT 6607**

**Period: December 1 through December 31, 1968**

**by**

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**Prepared For**

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## Contract Status Report No. 5

PROGRESS DURING THE PERIOD

All comparator readings (8 for each single-bar) of targets 1 and 6 on all film sets 1-5 for the f/8 material have been taken. One-half of the comparator readings (4 for each single-bar) of the corresponding targets and film sets for the f/16 material have been taken.

The microdensitometer trace has been made of the single-bar line from the 100 millisecond exposure of target 1 for all five sets in the f/8 material and also of the 200 millisecond exposure in the f/16 material. Widths of the single-bars have been computed using the half-density line width of each bar trace.

The system modulation transfer functions have been computed for the f/8 and f/16 material.

Analysis and data reduction continue dependent upon data acquisition.

PROBLEM AREAS

Data acquisition was impaired when access to the comparator was limited to half-days for about two weeks, setting the schedule back 1 1/2 weeks. This problem does not now exist, and it is expected that all data collection will be completed by January 10, 1969.

WORK PLANNED FOR NEXT PERIOD

The comparator readings will be completed. A microdensitometer trace of target 6 similar to that taken of target 1 may be undertaken if time permits. An analysis of variance will be completed and then all analysis and data reduction will be finalized. The rough draft of the final report will be written.

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WORK SCHEDULE

We estimate that at this point the work is six weeks behind the original schedule.

PERSONNEL

No changes have been made in the personnel assigned to this program.

PERCENTAGE COMPLETION

100% of Task 1 is completed.

100% of Task 2 is completed.

75% of Task 3 is completed.

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